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THE LEADING ROLE OF THE SOVIET UNION IN THE DESIGN OF COAL-CUTTING AND EXTRACTING MACHINES

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In 1927, the Soviet coal machinery industry began to turn out coal-cutting machines. Later, following the plans of A. K. Serdyuk, Stalin Prize winner, the industry equipped these machines with turned-up /L-shaped/ bars (Figure 1.) and looped /U-shaped/ ones. The chains used in these bars are of the so-called double-jointed type, articulated in two planes; Soviet plants were the first in the world to produce them.

A. K. Serdyuk's S-29 cutting machine, with turned-up bar and inertia starter in the cutter section, was put into series production at the Gorlovka Plant imeni Kirov in 1937 - 1938. It worked well in steep pitching seams. Turned-up and looped bars were later used in combines, with or without hydraulic breaker cartridges.

In 1941 and 1942, the Germans carried back from the Donbass some of the special Soviet contour cutter bars. Shortly thereafter, foreign technical literature began to mention the German SEKE-40 machine of the Eykgoff /transliterated; Eickhoff/ firm as having a turned-up cutter bar. Only one of these articles credited the Soviet Union with the invention of the turned-up bar. The article appeared in Glueckauf on 13 December 1941.

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The turned-up bar was incorporated into the design of the Rheinpreussen combines and the looped bar, in the design of the Neyyenburg [transliterated] combine. The turned-up bar with double-jointed balanced cutter chain began to appear in England during the last 2 years (Figures 2, 3).

English articles describing the contour bars fail to credit Soviet engineers with the invention, even though the authors of these articles must have been familiar with the prewar Soviet articles describing the Serdyuk bar. Some of the English articles have attributed the invention of the contour bars to the Germans. The French Revue de l'Industrie Minerale of May 1949 does give the Soviet Union credit for originating the turned-up bar, however.

Another Soviet invention, the vertical breaker bar, which is mounted on the end of a flat cutter bar for shearing away the undercut coal from the body of the seam, has received similar treatment abroad. In the early 1930's, this vertical breaker bar was incorporated by Engr V. G. Yatskikh into the YaR-3 combine. It was also used on cutting machines working steep pitching seams. Fifteen years later, coal cutters equipped with similar vertical breaker bars were used in the Ruhr basin; no acknowledgement was made of the Soviet origin of this device.

The Soviet Union leads the world in the automatic control of cutting machines. Before the war, the Gorlovka Plant imeni Kirov turned out a cutting machine designed by Engr M. V. Martynov and I. P. Kirichenko, which featured automatic regulation of the feed speed in proportion to the force exerted on the feed rope. A number of industrial models of this machine were tested before the war. Heavy cutting machines whose feed speeds are automatically regulated in proportion to the load on the motor are now being tested.

The Automatics Laboratory of the Institute of Mining Mechanics, Academy of Sciences USSR, has developed the principal systems for automatic cutting-machine devices, and, together with the Giprouglemash Institute and the manufacturing plants, has tested them in application.

The first combine for working soft seams was designed by Soviet engineers in the 1920's. The Bureau for Planning Coal Combines was established in Khar'kov in 1930. It has designed a number of combines in accordance with plans of Engr Romenskiy and Serdyuk. In the Donbass, in 1930 and 1931, industrial models of combines having one or two cutter bars, or bars with vertical breaker bars at the end, were built around series-produced cutting machines. Some of the first Soviet combines are shown in Figure 4 and 5.

In the postwar period, Soviet industry launched production of a number of new combines which cut the seam into sections with cutter bars, breaker rods, and shearing disks. Experimental work is now being conducted on coal planers which operate on the static principle. Dynamic-action planers are being tested industrially.

A survey of the mining combines abroad, insofar as can be judged from mining and scientific periodicals, must be limited to European countries, since the combines developed in the US are used almost exclusively for short-wall development work in rooms.

In the German coal industry, a small number of Eykgoff-Neyyenburg, Eykgoff-Rheinpreussen, and Zest-Ferrum [transliterated] combines (so-called Kuilen [transliterated] combines) have recently been in operation. The Kuilen combines are equipped with a looped or triangular bar and sometimes with a breaker bar having a shearing disk on the end. The combines can also be rigged with both looped and triangular bar (Figure 6). The combine runs along the frame of a face conveyer. The inner end of the bottom part of the looped bar is bent down 35-45 degrees, [giving a lower cut] and obviating a residue on the bottom of the seam.

Working a face 175-200 meters long in a soft-coal seam 1.1-1.25 meters thick, the machine will remove a strip of coal 0.9-1 meter wide. If backfilling is carried out, the productivity of the worker at the face does not exceed 4-5 tons per shift.

The first machines put out by the Zest-Ferrum Company had 30-horsepower motors. Following the Soviet example, the firm is now powering its combines with 55-60 kilowatt motors. The Germans borrowed not only the general design but even the individual units of the Soviet combines.

German interest in coal planers has apparently fallen off. The use of the planer is limited by the pronounced cleavage qualities of soft coal. There is no mention of testing or industrial use of coal planers in the /German/ press. The Germans are showing interest, however, in cutter loaders which are used in conjunction with explosives. These cutter loaders are of a type long familiar to Soviet engineers: they run along a conveyer frame, undercutting the coal as they move in one direction, and after the coal has been blasted, they move in the opposite direction, loading the coal as they go.

During the past 15 years, German coal-mining machinery has developed under the direct influence of Soviet designs, especially in the combine field. While cutting and drilling machines and combines are used mainly experimentally in Germany, they have long been used on a mass scale in the USSR, radically changing the technology of coal extraction.

England began to build coal combines considerably later than the USSR and Germany. The only series-produced English combine is the Meko-Mur /transliterated; Maco-Moore?/, which is powered by two 50-horsepower electric motors. Twenty-five of these combines were operating in the mines in 1947, while in 1948, there were 38 in use. In general design and the arrangement of the cutting elements, the Meko-Mur does not differ greatly from the Soviet combine designed by A. I. Bakhmutskiy (Figure 5). The Bakhmutskiy combine makes the upper kerf with a cylindrical or breaker-type bar; the Meko-Mur cuts the upper kerf with a regular cutter bar.

A new modification of the Logan combine (Figure 7), another English machine, has three horizontal bars: one at the floor, one at the seam midpoint, and a third at the top, mounted on an extensible column so that it can be adjusted to reach the top of the seam. In addition to these bars, there is a vertical triangular bar which separates the coal from the body of the seam. On the other side of the combine there is a vertical bar which shears transversely when the machine is stationary.

The Joy-Sullivan 60 horsepower Gloucester Getter combine (Figure 8) is being tried out in seams 1.12 meters thick. Its two horizontal bars undercut the coal at the bottom of the seam to a depth of 0.7-1.1 meters. A vertical bar mounted on the end of a laterally projecting element behind the horizontal bars shears the coal strip from the main body of the seam. This bar can be pivoted in the direction of advance. It is supposed that the plow at the rear of the combine will force the cut and sheared coal sections out from the seam onto the lower belt of the face conveyer. When it is desired to run the machine in a reverse direction, the vertical cutter bar and the projection on which it is mounted are affixed to a point on the other side of the horizontal cutter bars. This operation takes 30 minutes. It is planned to equip the combine with a dust-allaying device.

The combine of the Asksayd /transliterated/ Engineering Company is built around one of the company's own cutting machines equipped with a 75-horsepower motor. The machine has a bar looped in a triangular shape; the vertical part of the bar can be adjusted to suit the seam thickness although it has a minimum

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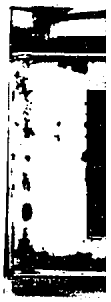
height of 760 millimeters. The manufacturers claim that the inclination of the upper kerf cut by the triangular bar facilitates the separation of the coal from the seam roof. A moving, inclined platform fitted with toothed blades 300 millimeters apart is situated directly behind the cutter bar. The oscillations of this platform break up the blocks of coal which have been cut by the bar, after which they pass onto a transverse slat conveyer at the rear end of the platform and are thrown onto the face conveyer. The moving platform is secured to the other side of the bar if the machine is to be run in reverse; the change does not take long. The machine reflects Soviet ideas throughout.



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